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EDITORIAL NOTES

A COMMITTEE OF ENQUIRY

FROM the official announcement in another column it will be seen that the Ministry of Fuel and Power has completed the arrangements for a Committee of Enquiry into the Gas Industry. We were able to forecast last February the institution of such an enquiry. Indeed, it seems the natural course of events. What are, in general, the circumstances? When the Industry was transferred to the newly-formed Ministry in 1942, it was already under an obligation, imposed upon it by the Board of Trade, to produce a plan for its own future, particularly in relation to its position under post-war conditions. No definition of these, it may be remarked, was attempted by the Board of Trade, so that in any case the assignment was a fairly vague one, though its purport was clear enough. With many other preoccupations on hand, and with absence of unanimity as to how such report should be arrived at, it is not surprising that the Industry had still not completed its task when the Ministry of Fuel and Power gathered gas, as well as coal, electricity, and oil under one administrative roof, with the general task of assisting them to give to the last ounce in war service, and presumably thereafter to settle down amicably together to afford a fuel service conceived on national lines—maintaining, it might be supposed, a nice balance between conservation of resources and the health, comfort, and prosperity of the people. Under this new arrangement it was clearly necessary for the new Ministry to discover all that it could about the industries under its charge, and fresh in the mind are the negotiations between patient Minister and hard-pressed gas executives which produced the Planning Report towards the end of 1943. As we noted at the time, this painstakingly compiled document was true to its name; it was a planning report rather than a plan; a series of questions rather than the answer to them. Moreover, it was quickly made evident that, though a very large majority of the Industry agreed that it should go forward to the Minister, there was by no means unanimity about its contents. In fact, to this day no agreement has been reached within the Industry on the formation of the British Gas Association—the proposed central body upon which the whole structure of reorganization was to be based.

Such, then, is the foreground which confronts the Committee of Enquiry at the outset of its labours—somewhat confused, it is true; even suggestive in parts of inherent weakness. There is also the much more solid background of unbroken technical progress extending over more than a century which fortunately gives the lie to any such suggestion and offers the Committee ample scope to work upon when they come to consider item 2 of the terms of reference.

PREVIOUS ENQUIRIES

THE terms, as will be seen, are widely drawn to cover every conceivable phase of the Gas Industry's existence. At first sight it may seem to those who have been in that Industry since, say, the end of the last war, that it has been subjected to a whole string of enquiries, yet closer examination of the matter reveals that the enquiries which have in fact taken place have been sharply defined in scope, and largely concerned in amendment of previous legislation. Not that the outcome has been unimportant or less than far-reaching. The 1920 Gas Regulation Act, for example, admittedly based on evolutionary thought and practice, necessarily brought into being by the circumstances of the last war, did effect a revolutionary change. Yet the various enquiries were essentially specific, and form a contrast with the "general" enquiries which have been made into the structure and the working of the electricity industry.

With the setting-up of the present Committee of Enquiry with its all-embracing terms of reference, it seems to us opportune to refresh our memories regarding the major Government-sponsored enquiries into the Gas Industry since the last war. Actually it was in June of 1917 that the Board of Trade and other Government Departments requested the Fuel Research Board to advise as to the most suitable composition and quality of gas and the minimum pressure at which it should generally be supplied having regard—and this is an interesting point—to the "desirability of economy in the use of coal" and the "adequate recovery of by-products." The Committee set up—consisting of Sir George Beilby, Sir Charles Parsons, Sir Richard Redmayne, and Sir Richard Threlfall—reported in January, 1919, and it was this report which eventually led to the Gas Regulation Bill enacted in 1920 and establishing the statutory therm. The following year saw the appointment of another Committee by the Board of Trade—again to consider a specific subject, whether it was desirable to prescribe any limitation in the proportion of carbon monoxide in gas supplied for domestic use. The findings of this Committee (composed of Sir William Pearce, Dr. Carnwath, Mr. Doig Gibb, and Dr. Gray) are well enough known and adequately quashed anxiety.

A few years passed until in 1926 there appeared the memorandum of the National Gas Council urging the need for amending Gas Legislation dating back to 1847, 1859, and 1871, to bring it into line with the conditions operating in the 1920's. The Board of Trade again took action, and a Sub-Committee of the National Fuel and Power Committee was appointed to look into the N.G.C. Memorandum. The Committee reported to the Board of Trade in 1929, in which year the Board itself issued a Memorandum. And this led to the formation of the Gas Legislation Committee, appointed in sequence to probe the report of the National Fuel and Power Committee and consider and make recommendations on general gas legislation and Special Order procedure. The Gas Legislation Committee—familiarly known as the Wrottesley Committee—duly reported in 1933 and framed clauses which were embodied in a Bill introduced in 1934 and enacted in that year. This Bill covered quite a large amount of ground, as is well known, including financial clauses, special clauses and bulk supplies, purity and pressure, and certain other points. Yet the terms of reference of the Committee which led to its formulation were, in common with previous Committees of Enquiry, circumscribed and restricted.

There have, of course, been other individual undertaking enquiries in relation to Bills the clauses of which had national significance. Such, for example, was the enquiry in 1937 before a Joint Select Committee of both Houses of Parliament to consider the powers of regulating charges possessed by the South Metropolitan and other companies authorized to operate under the basic price and dividend system.

THE INDUSTRY'S OPPORTUNITY

DULY warned as long ago as February that a general enquiry was likely to be held, it may be assumed that those who have an urge to be heard in evidence will have been busily engaged in its preparation. The Planning Report, as we have already remarked, raises questions rather than answers them, but whatever disagreement there may be within the Industry as to the answers, there must surely be very general agreement that the Report constitutes a fairly comprehensive list of the problems to be solved. Those who have the interests of the Industry truly at heart can feel nothing but a sense of relief that, by this move on the part of the Ministry, the bickerings and quarrellings which for some time have been imposing so heavy a drag on the more serious purposes of the Industry may be brought to a head.

We see two possible dangers. Firstly, enquiries of this nature are liable to occupy much time, and the Gas Industry cannot afford to regard the period from now until the production of the report as a well-earned rest cure. We know well enough that no gas undertaking, just because there is an enquiry on foot, will let-up on its own immediate job of making and supplying gas. What we have in mind is the task which, we believe, is being energetically pursued at Headquarters, and in which Headquarters need all possible support, of dovetailing gas service into the general post-war plans for housing the nation. Such plans will not await the completion of an enquiry into the affairs—largely internal—of the Gas Industry, and the point to remember in this connexion seems to us to be the positive assumption in the terms of reference that gas supplies can and must be developed and, what follows almost as a matter of course, cheapened. Secondly, in an industry which, like ours, has always been prone upon the least excuse, and at times for no other reason than that they are troublesome, to shelve its problems, we sense a slight danger that the present occasion may be regarded as the most superb shelf of all time. Avaunt the thought, and let us rather prepare ourselves for the indication of a broad policy to be implemented and developed by the Industry itself, with its wealth of practical experience hard won in more than a century of service. It appears to us probable that increased, rather than diminished, responsibilities will be our lot as the result.

Of the Committee itself, without discussing personalities we would only remark on its complete initial innocence of Gas Industry affairs—quite evidently a matter of policy, and perhaps a recognition of the fact that possibly the Industry knows as much about actual gas-making as most people. Yet even if technical details come under discussion, there is an engineer to explain why coal charges (when they do not stick) are self-propellant through vertical retorts but not through horizontals; a chemist to enlighten his fellow members as to the nature of this sulphur *about* which the Industry has made "such a stink." An accountant is doubtless included to shed final and everlasting light on the mystery of the therm, the cubic foot, and the gas bill, and possibly the representative of labour will come into his own when the question arises as to why the aristocracy, the upper classes, the upper middle, middle, and lower middle classes still use gas when many of them can well afford the luxury of electricity.

After which lamentable lapse into light-heartedness, let us affirm sincerely our conviction that a first-rate team has been selected to help us to deal with our difficulties. Let us unite in an effort to assist them in their labours, to the end that gas supplies to all types of consumer may be developed and cheapened, as we are all agreed they should be in the national interest. Our information is that methods of procedure are left entirely to the discretion of the Committee itself. We await their plans with the liveliest interest.

NON-AERATED-GAS BURNERS

FOR several years we have followed with the greatest of interest the development which has taken place in the application to many domestic and industrial purposes of burners for the consumption of gas to which, prior to its issue at the point of ignition, no air has been added. Which lengthy and clumsy definition we prefer to abbreviate to non-aerated gas burners. We commented on their use on more than one occasion last year, and since then we have had further opportunity of seeing how they have functioned on the district. The technique has been through the laboratory stage, and to the best of our knowledge had ceased in any way to be in the nature of a hazard. It has been advanced notably by the South Metropolitan Gas Company with the enthusiastic belief and tenacity of Mr. Dean Chandler, to whose work we have often referred.

But the extensive practical application of the non-aerated-gas burner principle for domestic and industrial purposes on the district is not, we imagine, widely enough known and sufficiently appreciated. This is one of two reasons why we return at the present juncture to the subject—which, to our mind, is one of importance and significance to the future use of gas. During the past seven or eight years experience has been gained not by a few isolated appliances specially installed and carefully nursed, but literally by thousands of pieces of apparatus and equipment operating under ordinary workaday conditions and in some cases, we might say, even in unpromising circumstances. We ourselves have followed this work in the field, and it is upon observation in people's homes and in industrial premises that we have based our view concerning the proved practice and the potentialities of the non-aerated-gas burner. And our opinion about this—indeed, our conviction—in no way whatever excludes the continued use of the bunsen burner from which a gas-air mixture issues to have complete combustion brought about by secondary air. The bunsen burner can stand on its record of service, and it has applications to which it is fitted better than any other type. But it does not, to our mind, preclude the extended use of the burner consuming non-aerated gas; and we are bold enough to prophesy a great development in the application of the technically mis-named "luminous flame" burner.

Of course the non-aerated-gas burner needs to be scientifically, not carelessly, applied. But for many purposes it does appeal to us on the several grounds of flexibility, ease of maintenance, simplicity of fitting, absence of troubles such as lighting-back, and the elimination or minimization of noise. These are major service factors of importance alike to gas consumer and gas undertaking, and we suggest that they are merits which demand widespread examination with a perfectly open mind. A further factor, perhaps of a secondary character, but none the less having considerable weight, is that of appearance of the flame in use and its atmosphere of restfulness. The non-aerated-gas burner is not a fussy piece of apparatus. For many operations the bunsen burner has come to stay. We think that for many operations, domestic and industrial, the so-called luminous burner (a term which finds no major place in the British Standard Glossary of Gas Industry Terms, the first edition of which will shortly see the light of day) *will* come to stay.

Our second reason for returning to the subject is the Research Paper by Messrs. Fuidge, Dewhurst, and Pleasance to The Institution of Gas Engineers (Communication No. 266), which in normal circumstances would have been presented at a November research meeting last year. Their Paper, which has just been issued by the I.G.E., is concerned with further study on the combustion characteristics of town gas; it is, in fact, a continuation of the work described in I.G.E. Communication No. 223 by the same Authors. Part of the present study relates to the behaviour of flames on non-aerated-gas burners, and we opened the report in eagerness, particularly in view of the fact that the Authors are on the chemical staff of the South Metropolitan Gas Company, on whose district, as we have said, practical experience of these burners has been gained over a number of years. It surprised us that no emphasis was laid by the Authors on this experience; in fact, our first impression was that the whole matter had been tackled anew and from the severely theoretical angle—a sort of reversal of the laboratory, pilot-plant, commercial-stage idea of investigation. And rightly or wrongly we gained a second overall impression that their attitude to burners of the type was exceedingly cautious—especially as they had made such a point that with the increased variety and complexity of appliances the Gas Industry can no longer expect its consumers to make adjustments to compensate for variability of the commodity, that it must ensure that consistently good service is obtained without attention to the appliances by consumers.

After considerable academic treatment and discussion the Authors set out in simple enough form certain conclusions drawn from their observations on non-aerated-gas burners. They pointed out that with such burners the possibility of back-firing is eliminated, adding that this is particularly useful in simplifying the ignition of gas appliances and in enabling the gas consumption of a burner to be reduced to a very low amount.

and that noise on extinction is prevented. Also, the burners give silent flames, which fact removes "one of the serious disadvantages of domestic gas appliances, particularly gas fires." Again, there is avoidance of the need to adjust gas and air ports, and over a wide range of gas composition the combustion conditions and the usable pressure range are unaffected by the characteristics of the gas, though naturally a change in density causes a corresponding change in thermal discharge. On the other hand, without reference to available district experience over the past eight years, the Authors stated that the jets of the non-aerated-gas burner are fragile, and in some cases may be appreciably more costly than a bunsen burner, and that to ensure satisfactory combustion a governed gas supply is almost essential. Comment was also made on possible trouble due to soot formation.

Regarding the last point we had been assured previously—and to-day we have no reason to doubt the contention—that practical experience has demonstrated that soot troubles do not occur if due care is taken in the selection of the right type and size of jet, and that it is correctly placed in relation to the appliance in which it is used. We had been assured, too, that the Authors' remarks on the fragility and cost of jets have not been borne out in practice, and that while a governor is desirable in many cases, it is not essential to ensure satisfactory combustion. Further, it had been impressed upon us that a small range of standard, accurately-made jets would meet all the requirements of domestic appliances. We had, in a nutshell, become quite convinced that sufficient district experience had been gained to render it most desirable to extend trials of non-aerated-gas burners throughout the country, and that the making of such trials would be neither reckless nor lacking in discretion—rather that the results of these trials would be towards a simplified and maybe a more satisfactory gas service in some directions. And perhaps because of this we found the present Authors' guarded statement—we do not criticize the academic lines of the investigation or the thoroughness with which it has been undertaken in the precise laboratory manner—rather lukewarm and rather remote. It almost seems to us that their inclusion in an I.G.E. Communication, without more reference than is made to the practical stage already achieved, is liable to convey a false impression on the subject of a development of prime importance.

Primitiva Gas

The very clear statement of the Chairman of Primitiva Holdings, Ltd., summarized elsewhere in this issue, on the strange behaviour of the municipal authorities of Buenos Aires towards the Primitiva Company, renders comment on our part superfluous. Indeed, Mr. Codrington voiced what would undoubtedly be the sentiments of anybody who holds British views of what constitutes justice and fair play, be he shareholder in Primitiva Gas or not. It is not within our province to discuss international relationships, nor to compile lists of those countries towards which the war has increased our goodwill or otherwise. But few of our readers will fail to rejoice with us at the knowledge that His Majesty's Government is watching the developments of the case with close attention, and that it has taken special steps to ensure that the Argentine Government is aware of the fact that such interest is being taken in the affairs of individual British concerns in spite of certain preoccupations elsewhere.

Meter Transport

Gas undertakings throughout the country will this week be receiving a circular notice, in the names of the firms concerned with gas meters, announcing the formation of a pooling scheme for road transport. They will doubtless rejoice at the good news that such a scheme is to come into operation; they will perhaps not be aware of the immense amount of negotiation that has been carried through by the representatives of the meter makers before the consent of the Ministry of War Transport could be obtained. Gas undertakings as well as the manufacturers owe a debt of gratitude to those who have worked really hard for the agreement, as well as to the Ministry for its ultimate consent, since it is no secret that the trade was under threat of having to carry out all meter transportation by rail only. Even in normal times the sending of delicate instruments by train was fraught with risks of a high percentage of damage. Under to-day's conditions the inconvenience which gas undertakings might have had to suffer from this cause and from delay is difficult to estimate. We feel certain they will wish to congratulate the makers upon successfully concluding the arrangement, and to co-operate, in order to ensure its smooth working, by carefully noting the points set out in the circular.

Ministry of Fuel and Power

Committee of Enquiry Appointed

The Minister of Fuel and Power has appointed a Committee of Enquiry into the Gas Industry. The terms of reference of the Committee are:

> "To review the structure and organization of the Gas Industry, to advise what changes have now become necessary in order to develop and cheapen gas supplies to all types of consumers, and to make recommendations."

The membership of the Committee is as follows:

Mr. Geoffrey Heyworth (Chairman).
Mr. Stuart Cooper, M.C., F.C.A.
Sir Jonathan R. Davidson, C.M.G., M.Sc., M.Inst.C.E.
Mr. Gavin Martin.
Professor D. M. Newitt, M.C., F.R.S.

The Secretary of the Committee will be Mr. A. F. James, of the Ministry of Fuel and Power, to whom all communications should be addressed at the Gas and Electricity Division, Ministry of Fuel and Power, New Oxford House, Bloomsbury Way, London, W.C. 1.

Mr. Geoffrey Heyworth is Chairman of Lever Brothers and Unilever, Ltd.

Mr. Stuart Cooper is a partner in the firm of Cooper Brothers and Company, Accountants.

Sir Jonathan Davidson was formerly Chief Engineer to the Liverpool Corporation Water Works, and subsequently to the Metropolitan Water Board.

Mr. Gavin Martin is General Secretary of the Confederation of Shipbuilding and Engineering Unions.

Professor Newitt is Assistant Professor of Chemical Technology at the Imperial College of Science and Technology.

Personal

William Edgar & Son, Ltd., have acquired the controlling interest in the Ufix Boiler Company, Ltd. Mr. E. JACKSON will remain with the Company as Technical Director, and for the time being will represent both firms in the North of England. Captain JOHN HEYMAN, recently invalided from the Army, has been appointed Southern Representative for William Edgar & Son, Ltd. He will also represent the Ufix Boiler Company in the same area.

Obituary

Mr. J. P. BLACKMORE, Public Lighting Superintendent to the Bombay Gas Company, Ltd., died on May 30 after a short illness.

1944 "Journal" Directory

Page 10. BRIGHOUSE. J. G. Tilley, *E. & M.*, *vice* J. Corrigan.
" 14. BUXTON. H. H. Knowles, *E. & M.*, *vice* F. G. Shaw, as from July 1, 1944.
" 16. CASTLETOWN. W. Cole, *E.M. & S.*, *vice* R. E. Wiles.
" 18. COMMERCIAL GAS COMPANY. E. H. Harman, *G.M. & S.*
" 40. LEEDS. N. G. Appleyard, *Asst. E. & M.*
" 60. SALFORD. D. V. Lewis, *E. & M.*, *vice* F. H. Goodwin.
" 62. SHEFFIELD. R. Halkett, jun., *C.E. & Asst. G.M.*, A. W. Field, *S.*
70. TREDEGAR. S. L. Filer, *E. & M.*, *vice* D. W. Davies.

Diary

June 9.—North of England Gas Managers' Association (Auxiliary Section): Darlington Gas-Works, 2.15 p.m.
June 13.—National Federation of Gas Coke Associations: General Committee, Gas Industry House, 10 a.m.
June 16.—Gas Research Board: Joint Research Committee, at Leeds or Bournemouth.
June 19.—London and Counties Coke Association: Finance Committee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 1.30 p.m., Gas Industry House.
June 22.—B.C.G.A. Domestic Heat Services Committee: Gas Industry House, 2.30 p.m.

There will be no meeting of the N.G.C. Central Executive Board in June.

Coke Grading*

By T. A. TOMLINSON, M.B.E., M.I.Mech.E.,

Chief Engineer, West's Gas Improvement Company, Ltd.

I. SUMMARY

THE Paper is based upon a study of the subject by G. Rouveix, in 1935. It reviews the qualities desirable in screening apparatus from the points of view of effective screening, construction and running cost.

Efficiency of screening is defined as the fraction—

$$\frac{\text{Weight of coke passing through the screen.}}{\text{Weight of screenable pieces in the coke fed to it.}}$$

"Screenable pieces" are those pieces of which the mean dimension is equal or inferior to that of the openings in the screening surface.

Theoretically it is evident that the optimum capacity of a screen will be obtained when the screenable piece approaches the screening surface in a path as normal as possible to the surface and at some limiting velocity, which, while it must be determined experimentally, should increase with the diameter of the piece. Data relating to certain types of screen are given. Other factors examined are size and form of pieces, humidity, and shape of opening in screening surfaces. Seven types of screen used in Gas-Works are briefly described. It is obvious that screening by the progressive elimination of the larger sizes will reduce abrasion on the screens, with an increase in the efficiency of screening.

Graded coke for domestic consumption must be freed from dust. Dust is of two kinds:

(*a*) That resultant from reactions within the retort and which is best removed at the point of discharge.

(*b*) That formed by abrasion in handling and which is best dealt with by de-dusting screens at outlet from storage bunkers.

It is shown that wetting the coke is not a satisfactory solution of the dust problem. Dust must be definitely removed by screening and suction, each applied at the correct points in the coke stream.

Plant design in accordance with the principles outlined in the Paper is shown in fig. 4. W. L. Boon is quoted to show that a considerable expenditure is justified on plant designed to avoid degradation by breakage and abrasion in handling and grading.

II. INTRODUCTION

It is probable that the only systematic study of the problem of coke screening is contained in a paper by G. Rouveix in 1935 under the title "Calibrage du Coke par Criblage." The Paper has not been translated, nor would a literal translation convey a correct impression of its great value. There is a difference of idiom as well as of mere language. The present Paper takes Rouveix's ideas as a basis, re-expressing them in the English idiom, with some additional considerations of English practice.

Rouveix's general conclusion is that in the end the method and apparatus to be employed in this process must be worked out experimentally, but that, nevertheless, it is possible to establish a certain number of rules by which the best grading and the most economical utilization of the apparatus can be attained.

The qualities of a good set of screening apparatus may be viewed from three aspects:

(*a*) Effective screening.
(*b*) Construction.
(*c*) Running cost.

Perfection from all points of view simultaneously is not easily (if at all) attainable, as is shown by the following examination in preliminary detail:

(*a*) *Effective Screening.*

(i) The apparatus must be such that the mass of coke to be screened must be kept in such a state of fluidity upon the screening surfaces that the screenable pieces reach the openings with a good measure of facility.
(ii) The trajectory of the screenable pieces should meet the screening surface at right-angles as far as possible and with a sufficient speed.
(iii) Blinding of the screening surface should be obviated.
(iv) The maximum efficiency—*i.e.*, the maximum proportion of screenable pieces actually passed through the openings—must be attained at the rated capacity.

(*b*) *Construction.*

(i) Coke screens should be very simple and very robust in construction.
(ii) The production of vibration in the supporting structure should be avoided.
(iii) It should be possible to remove and replace quickly and readily all parts subject to wear, particularly the screening surfaces.

(*c*) *Running Cost.*

(i) Maintenance cost should be as low as possible.
(ii) Contact of moving parts with the coke should be confined to the screening surfaces.
(iii) The apparatus should function in a normal manner without special supervision.
(iv) The space occupied should be low in proportion to capacity.
(v) The power consumption, whether loaded or light, should be as low as possible.
(vi) It follows from (*b*) (ii) and (*c*) (v) that both the weight and the amplitude of motion of reciprocating parts should be as low as possible.

III. THEORETICAL CONSIDERATIONS

Rouveix defines the "screenable pieces" in a mixture of sizes as those pieces of which the mean dimension is equal or inferior to that of the openings in the screening surface. The "efficiency of screening" he defines as the fraction—

$$\frac{\text{Weight of coke passing through the screen.}}{\text{Weight of screenable pieces in the coke fed to it.}}$$

He deduces from tests that the mean dimension of the largest screenable piece can only be ascertained by trial in every different case; that efficiency is not greatly affected by the proportion of very large or very fine sizes in the mixtures to be screened; but that for a given capacity the efficiency of screening is inversely proportional to the quantity of screenable pieces in the mixture fed to the screen.

Experiments show that there is no perfectly definite relationship between the dimensions of the opening in the screening surface and the mean dimension of the largest screenable piece. This relationship is affected by a great number and diversity of factors:

(*a*) The shape of the piece.
(*b*) Its superficial condition.
(*c*) Its degree of humidity.
(*d*) The angle of incidence of the trajectory as the piece strikes the screening surface.
(*e*) Its speed and position on the trajectory at the moment of contact with this surface.
(*f*) The superficial condition of the screening surface.
(*g*) The thickness of plate or mesh forming the screening surface.
(*h*) The shape and dimensions of the openings.

Most of these factors are studied in detail below.

Rouveix gives a very interesting mathematical analysis to show that for the best screening the screenable piece should approach the opening as nearly normal to the screening surface as possible, and that its velocity should increase with its diameter while remaining less than the limiting velocity.

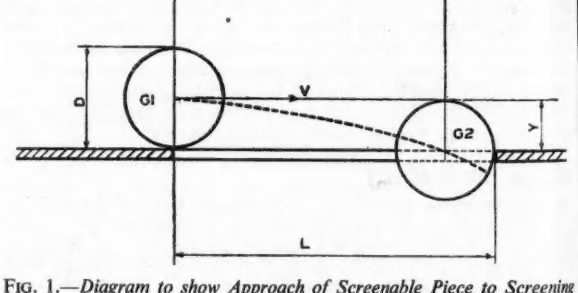

FIG. 1.—*Diagram to show Approach of Screenable Piece to Screening Surface.*

Consider a spherical piece of diameter D approaching tangentially, at the point G1, an opening of length L with a velocity V (relative to the screening surface) just sufficient to carry it to the point G2.

$$X = Vt, \text{ and } X = L - \frac{D}{2}$$

$$Y = g\frac{t^2}{2}, \text{ and } Y = \frac{D}{2} \text{ whence } t = \sqrt{\frac{D}{g}}$$

* I.G.E. Publication No. 265.

Where t is the time in seconds and g the acceleration due to gravity

$$V = \frac{X}{t} = \left(L - \frac{D}{2}\right)\sqrt{\frac{g}{D}}$$

$$= \left(\frac{L}{D} - \frac{1}{2}\right)\sqrt{gD}$$

Whence $\frac{L}{D} = \frac{V}{\sqrt{gD}} + \frac{1}{2}$

And in the limit, $L = D$, $V = 0.5\sqrt{gD}$

$= 2.84\sqrt{D}$ in ft. sec. units.

This velocity is the maximum (or limiting) velocity which will allow the spherical piece to fall through a circular hole of the same diameter, plus, of course, sufficient clearance.

The figures are probably not to be taken too seriously but the equations do support the two principles enunciated above. It is evident that the greatest capacity will be obtained in the region of the limiting velocity. And the analysis also explains why oscillating and vibrating screens give a much greater specified capacity than trommels (rotary screens).

In oscillating screens the trajectory followed by the pieces is sensibly parabolic; in vibrating screens the trajectory is a more or less flattened ellipse; in both the pieces fall nearly normal to the screening surface. In trommels, on the contrary, the greater proportion of the pieces slide over the surface and approach the openings tangentially—*i.e.*, in the least efficient direction. Experience shows that in oscillating screens the best amplitude is generally from 1 in. to ½ in., with a frequency of 350 per min.

In vibrating screens the process at its best is one of progressive elimination of the pieces in descending order of size. To secure the best economy of power and screening surface the screens with the larger mesh should vibrate at a slower speed and through a greater amplitude than those with the smaller meshes. But the velocity, in the sense used in the mathematical analysis above, can also be increased by increasing the inclination of the screen to the horizontal. For the optimum capacity it is obvious that while a single-deck screen can be adjusted as to speed, amplitude and inclination, in a double-deck screen these factors must be to some extent a compromise between the requirements of the two meshes, although it is, of course, possible to increase the inclination of the lower—*i.e.*, the smaller-meshed screening surface—to meet the requirements to that extent.

With regard to actual figures, Rouveix quotes Fraser and Chalmers for the following:

Mesh, mm.	Amplitude, mm.	Speed, r.p.m.
0 to 20	6	1,000
15 ,, 100	13	625
75 ,, 150	19	475

The "Pegson" screens are built to the following data:

In recent years the "Pegson-Telsmith" scalping and grading screens, together with the "Pegson Open-Deck" de-breezing or de-dusting screens, both of which are of the vibrating chassis type, have been widely applied to the sizing of gas-works coke—particularly the lighter cokes from the continuous vertical retort. Screening by elimination of the sizes in descending order of dimensions is of particular importance when handling this coke. A careful study, checked by experience, has been made of the amplitude and frequency of vibration, combined with a suitable angle of inclination, and the ideal data are given in Tables 1 and 2.

TABLE I.—DATA CONCERNING "PEGSON-TELSMITH" SCREENS.

Mesh, in.	Amplitude, in.	Speed, r.p.m.
0 to ¾	⅜ to $\frac{3}{16}$	1,460 to 1,185
¾ ,, 1½	$\frac{3}{16}$,, ¼	1,185 ,, 1,032
1½ ,, 2½ (and above)	¼ ,, $\frac{5}{16}$	1,032 ,, 920

It is only in exceptional cases that a mesh having apertures larger than 2½ in. square is called for. The angle of inclination is 18°/20°.

These data are applicable in cases where the arrangement of the plant allows of the use of single-deck screens throughout. This is not always practicable and double-deck screens are then needed. In such screens there must of necessity be some compromise between the ideal and the practical.

TABLE II.—DATA CONCERNING "PEGSON OPEN-DECK" (DE-BREEZING) SCREENS.

Mesh, in.	Amplitude, in.	Speed, r.p.m.
0 to ⅜	$\frac{1}{16}$	1,800

The angle of inclination is 22½°/25°.

De-breezing screens are set at a slightly steeper angle than the scalping and grading units because it has been found that a high-speed movement of small amplitude combined with an angle which allows the coke to gravitate (rather than be "forced") is better for de-breezing or de-dusting.

Very careful consideration is given to the condition of the coke to be handled (moisture content, percentage of "fines," &c.) and, where the moisture content is unavoidably rather high, meshes having apertures of rectangular shape, say, ⅜ in. by ¾ in., are fitted (instead of ⅜ in. square) to deal with the small sizes, thus ensuring a maximum screening area and the minimum tendency to blinding. The type of mesh normally fitted is constructed of straight strands of toughened steel wire, spot-welded at the intersections. This type has no "trapping" action on the coke and is a further deterrent to blinding. The vibrating mechanism of this screen is above the deck(s), clear of all coke, and in the most accessible position, while the mechanism of the "open-deck" unit has its bearings outside the screen frame and is therefore equally accessible.

IV. FACTORS INFLUENCING SCREENING

But apart from these considerations there are the other factors, most of which must be studied experimentally.

(*a*) *Size of Pieces.*—Screening is the more difficult as the screenable pieces are smaller, for the following reasons:

(i) The quantity of pieces in a given volume is the greater as their size is smaller.

(ii) The proportion between the useful area of the openings and the total area of the screening surface diminishes rapidly with the decrease in the dimensions of the openings.

(iii) The surface of the screenable pieces in a given volume is inversely proportional to their dimensions.

(*b*) *Feed.*—It is necessary to emphasize the importance of ensuring a regular and properly distributed feed to each screening surface.

(*c*) *Form.*—It is obvious that grading will be most accurate when the screenable pieces are polyhedric in form, perfect when they are spherical. Elongated ("finger") or flat pieces render accurate grading very difficult. For the finer grades—as in de-breezing screens—elongated (or slot) holes are necessary. Dense coke will generally screen quicker than light coke.

(*d*) *Humidity.*—This is of two kinds, absorbed moisture and superficial wetness.

(i) Total humidity—*i.e.*, water content—because it increases the density and favours quick screening.

(ii) Superficial wetness, however, hinders screening and the more so as the pieces are smaller. Consider two cubes with sides 10 and 1 mm. respectively, covered with a water film 0.01 mm. thick. The percentage of superficial wetness in the two cases is 0.6 and 6.0 % respectively—*i.e.*, it is inversely proportional to the dimension of the pieces. Following the laws of surface tension the very small pieces tend to stick together to form a spherical mass. They also tend to stick to larger pieces. When the moisture dries out these agglomerations fall apart and give the same result as bad screening. The same phenomenon is observed when water or other spraying is used to "allay dust"—the effect is merely temporary—a point referred to again below. Rouveix states that tests showed that in screening small coke, 10 to 15 mm. diameter, with more than a certain degree of humidity pieces less than 10 mm. stuck together, passed over the 10 mm. openings, and subsequently fell apart on drying.

(*e*) *Shape.*—Square openings in the screening surface give a more accurate screening when new than round openings. It is obvious that a circular opening of diameter d would pass spherical pieces of that diameter but cubic pieces not greater than 0.71 d, whereas a square opening of side d would pass both spherical and cubic pieces of that dimension. On the other hand, the square opening in a perforated plate quickly wears to a circle of $d\sqrt{2}$ say, 1.4d. Experience shows that rectangular (slotted) openings are more effective in de-breezing screens (fig. 2).

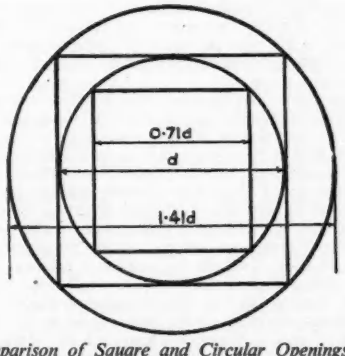

FIG. 2.—*Comparison of Square and Circular Openings in Screening Surface.*

(*To be concluded*)

Eastern Counties Gas Engineers' and Managers' Association

Presidential Address

of

W. J. COLLINS GARRARD,
Assoc. M.Inst. C.E.

THIS Association has a long record of able Past-Presidents, which renders the preparation of a Presidential Address a difficult one. May I here refer briefly to one such Past-President—namely, Mr. Frank Prentice, my first Chief. His recent passing at a ripe old age was a great loss, firstly to the Gas Industry, secondly to this Association, and particularly to my Undertaking. It can truly be said of him that he was a great man, and he is sorely missed.

Before passing on to the main theme of my Address, I propose to give you a few historical facts regarding the Company I have been fortunate to serve for the past 30 years.

It was in the year 1817 that three prominent citizens, two of whom bore an honoured name in the engineering world, conceived the idea of supplying the town with coal gas "for domestic, business, and public purposes." These three gentlemen erected a gas-making plant at a cost of just over £2,000. From old records it appears that the retort house was the least expensive part of the works, costing £71, against the "gasometer's" £500. Incidentally, the holder tank was styled a cistern in those days.

In 1821 a Company was formed as a result of the desire of the public to be supplied with "the new gaslight," which was recognized as being "something very much better than oil." The Royal Assent was given to "An Act for Lighting with Gas the Town and Borough of Ipswich in the County of Suffolk" on May 28 of that year. It was a remarkably comprehensive Act, containing 65 clauses, combining regulations not only in regard to gas-works, but in company management.

The Company's first engineer was William Cubitt, a man of great inventive ability. He later received a knighthood in recognition of conspicuous services to his profession, and he became President of the Institution of Civil Engineers. It is interesting to note that Mr. Cubitt invented the treadmill in 1818, and it is understood this instrument of torture was used at the local prison for grinding corn, thus saving power.

The first works was situated in the middle of the town, but the demand for gas soon necessitated the provision of a larger works. Great wisdom was shown by the acquisition of land with river frontage, and it was to this site that the works was moved in 1822. Some four years later Mr. Cubitt retired and was succeeded by Daniel Poole Goddard. Thus began an association of a family with the management and direction of the Company's interest which was to last nearly a century.

Ebenezer Goddard succeeded his father as engineer on the latter's death in 1842. He filled the position for forty years, and during this long period the history of the Company is one of continued progress and development. Half-way through the nineteenth century Ebenezer Goddard published for the Company an Address on the advantages to be derived from the general use of gas in private houses, &c., and announced a scheme for supplying gas fittings and apparatus for cooking, heating, and ventilating on hire, the Company engaging to keep the same in repair.

In 1882 Ebenezer Goddard died and was succeeded by his son, Daniel Ford Goddard, who after five years as engineer was elected to the Board of Directors. In 1901 he became Chairman of the Company, and he was still in that office when, 20 years later, came the centenary with its celebrations.

In that year, 1921, another famous name in the Gas Industry was added to the Board, when Mr. Henry Woodall became a Director. On Sir Daniel Ford Goddard's death a year later he was elected Chairman, and his great knowledge and experience generally in the Industry, added to his wise guidance of the Company's affairs, have resulted in continued efficient service and consequent prosperity during the past 23 years.

So much, then, for past history—and now for the present day.

It is safe to say that next to the war we are hearing more about planning in different spheres of life than any other topic. The predominant note of the past few years in our Industry has been the need for its replanning and reorganization. Planning committees have issued reports. Others have issued reports on the planning committees' reports. In the Technical Press comments are to be found at great length on the planning reports. The spate of suggestions and counter-suggestions descend on the poor gas engineer, seeking to appreciate what it all means, at such a rate that he would like to adopt the procedure of the well-known B.B.C. feature and cry "Stop!"—thus causing the war and thunder of the planners to cease for a few minutes while he could look round to see where all this reorganization of the Gas Industry is leading him. I therefore propose to look at the present position from the viewpoint of the average gas engineer responsible for the technical control of a gas undertaking, and for advising his Board or Council on the probable evolution of his undertaking during the next few years.

As I see it, the Gas Industry to-day is very much in the same position as was the dog with the bone in his mouth in the old fable. Spanning the pre-war world and the post-war world is a plank. The Gas Industry dog is on that plank holding in its mouth a meaty bone, gas being the meat and coke the solid bone. As the Gas Industry dog crosses the plank it looks down and sees reflected in the water a larger and much more meaty bone. The dog pauses. Shall it let go the bone it is holding for the sake of this more meaty bone? The new bone looks more attractive. It looks to have more meat and less bone—possibly no bone at all. Peering down, the Gas Industry dog sees on the bone the words "Pressure gasification," "methane synthesis," "high pressure distribution." At this stage, if the fable be followed, the dog drops the bone it is holding for the sake of the bigger bone and loses all. But I would like to finish my story in a different way. The Gas Industry dog looks down at the reflection in the water, and remembers that the larger and apparently more attractive bone is without depth or dimensions—it is a picture for to-morrow or the day after to-morrow. The dog therefore grips his present bone firmly in his mouth, looks ahead, and trots forward with confidence into the post-war world.

Any industry which is to survive must evolve, but I am impressed with the fact that the Gas Industry simply cannot afford to wait for large-scale changes in organization and production methods which are envisaged by the planners. We must have a "Target for To-day" as well as plans for to-morrow.

There is a danger that too much planning for the future may lead to a lack of decisiveness in the present. Suggestions that smaller undertakings are to be grouped with possible suspension of gas manufacture tend to reduce the enthusiasm in the works; suggestions that there are to be changes in gas production methods tend to check the expenditure of money on the modernization of existing plant, thus perpetuating the use of obsolete and inefficient equipment; suggestions that the aim and ideal of the Gas Industry is to eliminate coke and become an "all-gas" industry tend to depreciate the importance of coke in the structure of the Industry.

In my view there should be a short-term plan, and a long-term plan. At present too much attention is being given to the latter and too little to the former. Much that is said and written concerning the evolution of our Industry cannot have any practical significance in the next decade at least. An example of this may be given. It has been stated elsewhere that the Gas Research Board is erecting an exploratory plant to test out on a larger scale their process for the reaction of hydrogen on coal under pressure. Supposing this plant proves successful, presumably the next step is the building of a commercial plant in which it would be possible to determine the operating costs of the new method. Maintenance costs can only be determined by a number of years' operation. The rate of depreciation of existing forms of manufacturing plant is slow and the capital invested is large. Therefore, even if the new processes are found to be highly successful and economical (both of which are as yet unproven), the rate of introduction into and adoption by the Industry can only be gradual.

This applies equally to the question of high-pressure distribution of gas. Very large sums are already expended on the existing distribution and storage plant, and any changes in distribution technique must of necessity be gradual.

These thoughts have been exercising my mind in recent times for a very practical reason. My own undertaking has been faced with the problem of deciding whether to continue gas manufacture in plant which had reached the end of its efficient working life, or whether to provide entirely new plant, taking advantage of the most up-to-date technique available. One does not lightly recommend the expenditure of large capital sums which will take 15 or 20 years to write off on plant or processes which may become obsolete before that time, but having considered all the facts we have taken the decision to install new manufacturing plant, confident that we shall not only reap an immediate benefit, but that the plant will be able to have a long working life before any new processes render it obsolete.

If the Gas Industry desires a target for to-day it may perhaps be summarized as follows:

(1) Confidence that the Industry has provided and will continue to provide a great service to the community.

(2) Conviction that at least for many years this service will best be met by an active development of the Industry as a two-fuel industry —namely, gas and coke.

(3) Realization that a good distribution system is of supreme importance.

(4) Promotion of a progressive price structure to encourage the use of gas.

(5) Adoption of the most modern methods of gas production and treatment to ensure the supply of gas of uniform quality at economic cost.

(6) Strengthening of the relationships between the employer and employee, in which the Gas Industry already holds such a good record.

Would it not put much of our planning for the future into better perspective if it were realized both within and without the Industry that whatever may be our long-term policy (as yet undecided) we are aiming at a common target for our short-term policy? One of the precursors of future prosperity is not necessarily the overthrowing of the economic, technical, and geographical basis upon which a great Industry has evolved. I would like to say a few words on each of these six points.

(1) *Confidence.*—An Industry can only be successful if those who work in it believe in it. We must convince everyone we meet that we believe in the great importance of the Gas Industry. Sometimes I think we tend to be overawed by the glamour of our younger brother, the electricity supply industry, and tend to bemoan the loss of fields in which we are superseded, instead of concentrating on those fields in which gas has a great advantage. I am convinced that in the post-war world the Gas Industry will see a large expansion in domestic and industrial demand, and that we can look ahead with confidence to the future.

(2) *A Two-Fuel Policy.*—It is a matter of great importance for us to know whether we are to envisage an "all gas" or a "gas and coke" industry in the immediate future, because on the answer to that question must depend the selection of suitable gas manufacturing plant. It was therefore of particular interest to members of The Institution of Gas Engineers to read the opinions of the Committee of Inquiry on Coke Quality in their recent report. This Committee, under the Chairmanship of Col. H. C. Smith (who has done so much for the improvement of the coke position by his work with the London and Counties Coke Association), expressed the opinion that for some time to come the policy of the Gas Industry will be to develop as a two-fuel industry—namely, gas and coke. The Committee suggested that there are many reasons for this, the most important being:

(*a*) It must be many years before the research now being conducted reaches such a stage that large-scale complete gasification plants will replace present systems of carbonization.

(*b*) It is unlikely that the British public will give up solid fuel fires unless compelled to do so.

The Committee further urge that this two-fuel policy should be stressed because there are still gas undertakings which are unconvinced that they can institute a vigorous coke policy without upsetting gas sales.

I have quoted this authoritative statement because it helped me to finalize my own views on the matter when planning my post-war manufacturing programme. At Ipswich there is no "coke problem," nor do we expect to have one. In fact, we have to import coke in large quantities to satisfy our local requirements. It is only fair to say that we aim at producing an entirely acceptable coke—a dry, well-screened coke made from Yorkshire coals in continuous vertical retorts.

Looking to the future, I am very doubtful whether the Gas Industry, limited to making gas only, would be offering a greater service to the nation than an industry as at present constituted which makes two smokeless fuels—one gaseous and one solid. Whereas gas may be regarded as being a superior smokeless fuel to coke, it costs more per effective therm than does coke for such duties as water and space heating.

Continuous hot water will probably become more and more regarded as a necessity in every home. On the other hand, the amount of a man's income to be spent in fuel has a definite limit, and when it comes to a decision between the elimination of luxuries or the acceptance of a little more trouble from the use of solid fuel for water heating, my personal view is that the householder will maintain the solid fuel.

The combustion of a well-graded coke of reasonable ash content in a domestic hot water boiler of adequate grate area is almost a trouble-free operation. I find difficulty in believing that the householder of moderate means will adopt gaseous heating if this involves substantially more cost.

Again, the economy of the open coke grate as a means of room heating cannot lightly be discarded. In my view the Gas Industry is only at the commencement of a period of large expansion in the use of open grates which will bring with it a demand for suitable coke.

Until it is proved in practice that gas and coke can be made available to the consumer at approximately the same price per effective therm, then the expansion of the coke market is a matter of great importance to the Gas Industry. To-day, a high value for coke, with its immediate influence on the net cost of coal, has a predominant influence on the cost of making gas.

(3) *Distribution.*—It is my belief that gas undertakings with bad distribution systems involving uneven or insufficient pressure at the consumers' appliances bring the name of the Industry more into disfavour than by any other means. Post-war consumers with alternative supplies available in the form of electricity will not tolerate an inadequate supply of gas. It is therefore of first importance for undertakings to see that their distribution system can supply gas at adequate pressure and in sufficient quantity at their present consumers' premises. Only when this is achieved can an undertaking look with confidence towards schemes for increasing the sale of gas per consumer by two or three times.

At Ipswich it has always been the policy that the distribution system must be kept up-to-date to meet the demands of the time.

In 1938 I gave a full account of our distribution system in a Paper to this Association, and I will therefore content myself with refreshing your memories. Briefly, the building of a by-pass road to our town, bounding it from the north-west to the south-east, gave us the opportunity of running a high-pressure ring main right round the outskirts. We had originally laid this main to supply Felixstowe and the by-pass road crossed its path at one point. From this high-pressure main connexions were made to feed back into the existing low-pressure system, by means of automatically loaded cam-operated governors. In this way the drag on all trunk mains from the works was greatly relieved, and perfect pressure conditions were obtained all over the district. The high-pressure main has also been extended to serve two large housing estates which were developed in the outskirts of Ipswich. No trouble has been experienced and an adequate supply of gas has easily been maintained, automatic governors again being used.

(4) *Price Structure.*—It is generally agreed that the post-war period will see a development of various methods for charging for gas, framed with the object of encouraging its use. Mr. R. C. Taylor, in his recent Presidential Address to the Southern Association of Gas Engineers and Managers, explained the approach and decision of his Company on this matter of gas tariffs—and the success which followed their adoption. In fact, Mr. Taylor's Address embodies and underlines three of the points I have already made—*viz.*, confidence in the Industry, realization of the importance of distribution, and establishment of a progressive price structure. At Ipswich at the moment a system of discounts is in vogue, for both domestic and industrial consumers, but with the cessation of hostilities and the removal of wartime restrictions, lower costs, and the improved results from our new gas-making plant, consideration will undoubtedly have to be given to future price policy and the adoption of a scale of tariffs.

(5) *Modern Method of Gas Production.*—At an early stage in this Address I mentioned that my Undertaking had recently been faced with the problem of either continuing gas manufacture in obsolete plant involving a high cost of production, or, on the other hand, expending a considerable sum of money for the purpose of installing modern carbonizing plant which would reduce manufacturing costs. Having settled in our minds that there was not likely to be any major change in present gas-making methods which would render a new plant prematurely obsolete, the next step was to decide what type of plant to install. As has already been explained by various writers in the past, there is no single ideal carbonizing plant for all coals, conditions, and localities. For us there appeared to be a clear-cut case that this new plant should take the form of continuous vertical retorts, and it may be of interest to record briefly some of the reasons as they are relevant to the theme of this address.

At the present time we distribute gas with a calorific value of 450 B.Th.U. after benzole washing, using mainly Yorkshire coal. Continuous vertical retorts give us flexibility in choice of calorific value of gas according to variation in market. At a time when some anxiety is expressed as to the future of coke—as is indicated by the interest in complete gasification methods—I do not think that it is sufficiently well realized that a reduction in calorific value by steaming or by external water gas dilution is the quickest way of controlling a changing coke market. For example, the weight of coke to be sold per therm of gas when making 450 B.Th.U. gas in continuous verticals is only two-thirds of that to be sold when making 560 B.Th.U. gas in horizontal retorts. As we are distributing 450 B.Th.U. gas, continuous vertical retorts give us the opportunity of making a high yield of gas per ton of coal in a one-stage process. Should coke markets change we have the opportunity of varying our calorific value without disturbing our manufacturing methods.

(To be concluded)

We are Advised by William Sugg & Co., Ltd., Ranelagh Works, Chapter Street, Westminster, S.W. 1, that their works will be closed for holidays from July 1 to 9 inclusive.

A Meeting of the North of England Gas Managers' Association (Auxiliary Section) will be held at the Corporation Gas-Works, Darlington, at 2.15 p.m., on June 9, and will be followed by a visit to the works of the Whessoe Foundry and Engineering Company, Ltd.

The Bristol Engineering Directory, 1944 Edition, gives complete information on Bristol's engineering activities, together with other technical information. The price of the book, including postage, is 9d., and the Bristol Engineering Manufacturers' Association, 104, Filton Avenue, Bristol 7, will be pleased to supply copies while stocks are available. Those applying are asked to mention the "GAS JOURNAL."

The Minister of Health, Mr. Willink, and the Deputy Secretary to the Ministry, Sir John Wrigley, with other officials, recently visited the model post-war kitchen at Radiation House as guests of Mr. D. A. A. Gibson, the Coventry City Architect. A few days earlier a party of 34 members of the Midland Branch of the Institute of Housing also inspected the structure.

Meters, Ltd.—The 47th annual meeting of Meters, Ltd., was held at Manchester on June 6. Mr. J. Morley, in a statement issued to shareholders, announced that the net profit of £30,623 for the year ended March 31, 1944, was slightly more than for the previous year. All branches of the Company continued to be fully employed, and were doing all they could to meet the demands made upon them, consistent with the available labour. The subsidiary Company again reported a successful year, and had paid a good dividend. Buildings, machinery, and plant had been kept in as good a state as possible, and a large amount had been expended on repairs and renewals. Dividends were recommended at the same rates as last year, namely, 2½% on the Preference stock, making 5½% for the year, and 6% on the Ordinary stock, making 10% for the year, all less tax, and £5,000 was transferred to a reserve for deferred repairs.

Primitiva Gas Company

In view of the fact that over 99% of the shares of the Primitiva Gas Company of Buenos Aires are now held by Primitiva Holdings, Ltd., the recent annual meeting of the Gas Company was confined to formal business, and the Company's affairs were more fully dealt with at the annual meeting of Primitiva Holdings, Ltd., in London on June 6.

In his statement issued to the shareholders, Mr. W. M. Codrington, Chairman, said the Gas Company's profit of £167,000 for the year ended Dec. 31, 1943, was £20,000 up on the previous year, and had enabled the Primitiva Company to pay a dividend of 1¼% free of tax, after allocating £120,000 to depreciation and renewals reserve, and £10,000 to contingencies. During 1943 the number of gas consumers increased by nearly 3% to 146,460.

Referring to the recent expropriation decree, Mr. Codrington said that in 1941 the Municipality of Buenos Aires approved a contract conferring on the Y.P.F. (the Federal Petroleum Department) a monopoly for the supply of gas to the city of Buenos Aires for 50 years from Jan. 1, 1945, and in the same year the National Executive Power approved a finance plan involving the expenditure of 70 million pesos by the Y.P.F. to enable them to provide the necessary installations. Meanwhile the Company's contract had been extended on various occasions by municipal ordinances for varying periods. One of those ordinances stipulated that the Company should remove its mains, &c., on receiving six months' notice to that effect—a provision against which the Company filed a protest. Thus the Company's ownership of its plant and mains had never been seriously disputed, though it must have been apparent that even were it conceivable that every street in the centre of Buenos Aires should be torn up in order that the mains might be replaced by new ones installed by the Y.P.F., the credit allocated to that department for the purpose could cover but a fraction of the immense cost involved.

It had always been clear that though the Company was willing to continue to furnish a gas supply on reasonable terms and was possessed of the funds necessary for making much needed extensions, the question whether it should be allowed to do so was one of policy entirely within the competence of the Argentine Government. All the Company had claimed was that, if the service was to be nationalized, the authorities should agree with the Company for the payment of a fair price for the whole of its installations, without which they could not possibly assure the service.

It was now more than 80 years since the first of the companies now embodied in the Primitiva Gas Company started to serve the capital of the Argentine Republic. Operations had expanded and efficiency had increased till to-day the shareholders were possessed of a thoroughly up-to-date and well-managed concern, furnishing an excellent service to its consumers. They could imagine, therefore, the impression created on the Directors and on thousands of shareholders when, without warning or recent attempt to negotiate, they learned from their morning newspapers on April 18 that the present Argentine Government had issued a decree declaring the Company's property to be of public utility and subject to expropriation, and putting forward the ludicrous figure of 19 million pesos as the present value of their extensive plant. And even from that they deducted the sum which they estimated it would cost them to remove their installations.

All the facts so far known had been communicated by circular to the shareholders, except that expropriation proceedings were initiated by the Argentine National Treasury solicitor in the Federal Court on May 10. Though the Company might not be able, or indeed desire, to object to the compulsory purchase of the undertaking in the manner laid down in the Argentine expropriation law, this decree seemed to vitiate the whole basis on which the Federal Court was invited to proceed in assessing the compensation due. The decree appeared to envisage as the correct measure of value the liquidation value of the physical assets, less the cost which the Company would have had to incur in removing them even if the authorities permitted it to do so. In fact, what the Government was setting out to acquire was not merely a collection of physical assets considered as so much scrap, but a going concern earning a reasonable profit and giving a good service. Any doubt on that point might be resolved by the preamble to the decree, which stated in so many words that "the properties of the Primitiva are essential and could be used temporarily by the Y.P.F. without prejudice to the obligation to replace them as soon as circumstances permit." So far, at any rate, as the mains were concerned, it was inconceivable that the order to remove them could ever be fulfilled.

The authorities wished to acquire the Company's installations in order to use them as they stood, for without them they admitted that they could not keep the city supplied with gas, nor could they do so for many years to come. How, then, could they possibly claim to charge the Company with the cost of removing them? Any question of liquidation value was purely artificial, and in no sense represented the true value on which compensation ought to be based for what was admittedly an efficient, profit-earning concern.

Under the expropriation law the Federal Court was charged with the duty of assessing the amount of compensation to be paid after hearing experts on both sides, but if the court were in any sense guided by the grotesque basis contemplated in the expropriation decree, grave injustice might be done to a Company which asked for no more than the fair treatment to which its years of good service to the Argentine public clearly entitled it.

The Company had addressed a note to the Argentine Government rejecting the offer of 3,758,740 pesos for its assets and requesting that the Government should study the situation afresh. At the same time, as had been stated in the House of Commons, the British Ambassador in Buenos Aires had been instructed to take steps to ensure that the Argentine Government was aware of the close attention with which the British Government was watching the developments of the case, with particular reference to the question of the compensation to be paid to the Company.

Associated Gas and Water Undertakings, Ltd.

The Eleventh Ordinary General Meeting of Associated Gas and Water Undertakings, Ltd., was held on May 25 at 2, Chart Lane, Reigate.

The Chairman, Mr. W. H. BENNETT, said: The report and statement of accounts have been in your hands for the prescribed period and, if you approve, we will follow our usual procedure of taking them as read.

The ban on the publication of the accounts of gas and electricity undertakings continues and I am precluded, therefore, from commenting on the operations of our subsidiaries during the past year. It is difficult to understand what useful purpose is now served by this embargo, which illustrates the ease with which controls are applied and the difficulty of securing their removal. The satisfactory nature of the accounts now before you, however, indicates that our business has been successfully maintained both as to gas and electricity.

The results achieved are particularly gratifying having regard to the extreme difficulties under which gas undertakings work. Although their primary raw material—coal—is a national resource, the mining situation has been allowed to deteriorate to a critical stage. Coal is in short supply, and is not made available in qualities suitable for efficient and economical gas manufacture. This has necessitated Governmental directions requiring us to manufacture gas from more expensive materials, which have to be imported from overseas, thus increasing the demand for shipping. Is it not remarkable, therefore, that the engineers and managers of our companies, with the loyal co-operation of their employees, have been able to maintain uninterrupted supplies of gas to the public in general and for war purposes in particular?

They have successfully surmounted the obstacles of labour shortage and of control at every point of their operations. Our sincere thanks are due to them for their efforts, the maintenance of which has become increasingly difficult in this fifth year of war. But the continuance of uninterrupted supplies of gas should not be taken for granted by those in authority, and we need the fullest measure of support and understanding from the Ministries, especially as to labour, if the essential service we provide is to be adequately maintained.

Since proprietors last met the British Gas Federation has issued its report on the planning of the Gas Industry, an outstanding and vital document which was described by *The Times* as "a notable contribution to the discussion of industrial reconstruction." The report strongly opposes the nationalization of the Industry, but advocates its continuance on a basis of company and municipal enterprise with a substantial measure of "geographical and functional integration." By this is meant the reduction, by association or amalgamation, of the number of undertakings operating independently and the integration of their practice, policy and organization. This is precisely what your Company, as one of the pioneer gas corporations, has accomplished.

In the prosecution of this new movement, considerable and unique experience has been acquired of the problems involved and their solution. Practically all our undertakings now operate in two geographical groups in Southern and South-Western England. Manufacturing units have been interconnected and the management of subsidiaries has been co-ordinated. Technical, commercial, and administrative supervision and services have been afforded them and their adequate finance on advantageous terms has been secured. The war has necessarily retarded such development, but with the cessation of hostilities our activities, which are now being planned, will be resumed in intensified form.

There are a few points in the accounts to which attention might usefully be drawn. No further undertakings have been acquired, but £28,903 has been expended in the purchase of additional holdings in existing subsidiaries. This expenditure has been met principally out of cash resources, the issue of new capital amounting to only £7,445. It will be noted that a further sum has been written off investments in subsidiary and other companies, bringing the total written off since the inception of the Company, almost ten years ago, to nearly £54,000.

Revenue shows an increase of £15,092, while expenditure—including the provision of £4,000 as an additional reserve for taxation and writing £4,150 off discount on Debenture stock—has only advanced by £9,541. The increase in net profit is, therefore, £5,551. If proprietors approve the Directors' recommendation regarding the declaration of final dividends, £32,500 will remain to be carried forward. This sum, with the reserve for equalization of dividend set aside last year, suggests there is good prospect, despite these difficult times, of the maintenance of the current rate of dividend upon the Deferred Stock, a position which, it is submitted, is decidedly satisfactory.

The report and accounts were unanimously adopted.

Benzole Recovery by Activated Carbon

(*Concluded from p. 701*)

The following operating cost figures were given for benzole recovery by the wash-oil process incorporating vacuum distillation, all on the basis of pence per gallon of benzole, and in reading them one should definitely not connect them in any way with present-day production costs, which, as they all knew, were influenced by the rising cost of coal.

Oil replacement (special absorption oil)	0.320
Process wages	0.330
Steam, 25 lb. at 5s. per ton steam	0.670
Water, 60 gallons at 3d. per 1,000 gallons pumping charges	0.180
Repairs and maintenance	0.024
Sundry charges	0.024
Salaries, wages, insurance, &c.	0.059
Provision for renewals	0.034
	1.641

The last three items in these costs had been taken as equal to those quoted in the Paper, although it might be added that the figure for renewals would not be as high as 0.034d. per gallon; these figures had been taken for comparison.

It would be seen that the operating costs per gallon with a vacuum plant were 0.628d. per gallon less than those quoted in the Paper, and that even with the figure of 2.040d. per gallon which would be obtained when carbon was charged at the replacement price of £35 per ton, vacuum distillation and oil-washing showed an operating cost of 0.399d. per gallon less than carbon.

It would be observed that he had taken the costs as given in the Paper for comparison, but the results obtained with oil-washing *via* overall recovery efficiency and sulphur removal were higher than those given in the Paper.

When it was considered that the other carbon plants mentioned in the discussion, operating with a much shorter carbon life of two to three months, and producing 7 to 8 gallons of benzole per pound of carbon as compared with 6 months and 13.7 gallons of benzole per pound of carbon quoted in the Paper, it would be seen that the carbon costs on these plants would be double those quoted in the Paper, and yet the results obtained were very similar to those given for oil-washing with vacuum distillation—*viz.*, 88% overall benzole recovery, 55% sulphur removal.

Compared with these plants vacuum distillation oil-washing would show a comparative operating cost per gallon of 1.641d. as against 2.312d. for a carbon life of three months and, of course, a still greater difference in a carbon life of two months.

From the foregoing it would be seen that oil-washing with vacuum distillation had 0.5d. approximately per gallon in hand for similar results, and should this 0.5d. per gallon be used to circulate a greater quantity of oil as payment for the extra steam charges resulting, by the circulation of 25 gallons of oil per 1,000 cu.ft. of gas, organic sulphur could be removed to the extent of 75% *regularly*, and not falling off as with carbon, which had an initial organic sulphur removal of 65%, falling to 50% and less as the carbon becomes fouled. To circulate 25 gallons of oil per 1,000 cu.ft. and maintain maximum stripping of toluene, xylene, &c., from the oil would require 50 lb. of steam per gallon of benzole produced, this figure being 25 lb. per gallon of benzole more than the steam required for 50–55% sulphur removal. The extra 25 lb. of steam per gallon would cost an additional 0.67d. per gallon and give an overall operating cost of 2.311d. per gallon, which compared very favourably with any figures they had been given on carbon, either in the Paper or during the discussion. Incidentally, the vacuum distillation plant was, if anything, slightly lower in capital cost than the carbon plant, but generally they could be considered equal.

In conclusion he would like to state that he agreed with Mr. Applebee as regards a benzole plant being used as a method of sulphur removal. No matter what the type of benzole recovery plant used, when that plant was operated as a sulphur removal plant the sulphur appeared in the benzole and thus reduced the price received for the benzole. He felt, however, in view of the results of a great amount of research that had been carried out, benzole recovery was an integral part of organic sulphur removal. Catalysis had shown that carbon disulphide and carbon oxysulphide could be converted to H_2S and removed with comparative ease. Thiophene, however, was not converted. Its structure showed the difficulty in conversion without hydrogenating benzenoid hydrocarbons at the same time, which was to be avoided.

In view of the circumstances, a catalytic conversion on benzolized gas, followed by benzole recovery, would (1) reduce the sulphur content of the benzole to around 0.5%, and (2) reduce the organic sulphur in town gas to 2 or 3 grains per 100 cu.ft.

Mr. **Applebee**, in reply to Mr. Nicklin, stated that the added risk of fire in the case of oil arose, not from its flash-point, but from the fact that in the event of fire starting elsewhere, the presence of some few thousand gallons of oil in the vicinity might prove a real danger. With regard to cleanliness, there was no doubt that with a perfect plant—washer and still included—together with a perfect operator, &c., oil-washing would be a clean process. It was true that, with certain reservations, creosote oil might be used for oil-washing but, in fact, it was not customary in the Gas Industry.

The benzole content of coal gas, whether horizontal or vertical, was apt to change with the conditions of carbonization, and any generalization as to the available benzole in the gas was unwise. There was little doubt that a high percentage recovery could be obtained from activated carbon plants. They did not suggest so high a recovery as 99%, but had the carbon been changed in accordance with the usual practice, they would probably have recovered an average of approximately 3.7 gallons per ton, which would have represented approximately 90%. Well-run oil-washing plants of the normal type might have an efficiency of up to, say, 85%, and there was no doubt that the vacuum type of plant was capable of giving higher percentage recoveries, probably equal to those of activated carbon plants, as they had previously suggested.

With regard to the naphthalene content of the gas, this disadvantage was pointed out in the Paper. The arrangements they had in mind would in fact involve very little in the way of charges. It would not be necessary for them to install an oil regeneration plant, since they had other means of disposing of the very small quantity of oil which would normally be involved.

Their own plant had been in operation for so short a period that the costs were somewhat uncertain and were given with some reserve. None the less, it would appear that had the plant been worked normally and the carbon rejected after the 80-minute cycle, the cost of carbon would have been only about 0.36d. per gallon. As they had said, however, they hoped under more normal conditions to effect further economies which might reduce the operating costs.

The sulphur removal efficiency of the two types of plant—each working at its best—was similar, as would be expected. The sulphur removal question would be seen in its proper perspective only when methods for the complete elimination of sulphur were available and generally adopted.

To summarize, it would appear that the results achieved by both plants were similar. The operating costs for the moment appeared to show some advantage to the vacuum distillation plant, but they would prefer to suspend judgment on this point until they had had further experience. The choice of the type of plant must, it seemed, be based on considerations other than those discussed. They themselves sought only to present the facts of their own experience, and not to make a choice between the various types of benzole recovery plant which were available.

Scottish Juniors

The Annual Meeting of the Scottish Junior Gas Association (Eastern District) was held in the Heriot-Watt College, Edinburgh, on May 27. Mr. T. B. Livingstone presided. The minutes of the previous meeting were read and approved on the motion of Mr. Brown, seconded by Mr. Alexander.

The balance-sheet was approved, as also were the various reports.

The following Office-bearers were elected for Session 1944–45:

President.—W. Masterton, Edinburgh.
Vice-President.—J. R. Denoon, Edinburgh.
Hon. Secretary and Treasurer.—W. H. Carson, Edinburgh.
Education Representative.—S. G. Melville, Edinburgh.
Transaction Secretary.—Miss E. Robertson, Perth.
Librarian.—A. Doran, Edinburgh.
Members of Council.—Messrs. Sawers, Perth; Ramsay, Galashiels; Air, Cowdenbeath; Doran, Edinburgh; Brown, Leven.
Hon. Auditors.—E. Alexander, Edinburgh, and E. Farquhar, South Elmsall.

The Membership Report showed an increase of 11 over Session 1942–43.

Imperial Continental Gas Association.—The net surplus for the year to March 31, 1944, was £53,511, against £51,667 for the previous year, but the progress during the past year, although satisfactory, was not such as to permit the Board to form any accurate estimate of the true financial position or to make any reliable forecast of the post-war situation. The Directors are unable to recommend payment of a dividend, but have carried £50,000 to general and specific reserves and added £3,511 to the carry forward. The Association celebrates its 120th birthday this year, and looks forward to playing some part in fostering international understanding and goodwill in the post-war world.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

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GAS PRODUCTS PRICES

The London Market June 5.

A new Government Order came into effect on March 1 controlling the price of Benzole and Coal Spirit and replacing the Control of Coal Tar Naphtha and Xylole Order, 1943.

The Order is known as the Control of Benzole and Coal Spirit Order, 1944 (S.R. & O. 1944, No. 172).

By this Order the price of Motor Benzole is fixed at 2s. per gallon. The Order also lays down the method of evaluating Crude Benzole.

The Order also calls for periodical returns to the Ministry of Fuel and Power from all producers of Crude and Refined Benzole.

The only item of interest in connexion with the Coal Tar products market is the issue of Government Order designated the Control of Toluene (No. 4) Order, 1944 (S. R. & O. 1944, No. 170), which contains an amendment of the Control of Toluene (No. 3) Order, 1943.

Prices of Coal Tar products are unchanged.

The Provinces June 5.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 1s. 11d. to 2s. 1d., pure, 2s. 7½d. (controlled by the Control of Toluene No. 3 Order, dated July 14, 1943, operative from July 20, 1943). Benzole and Coal Spirit, also Coal Tar Naphtha and Xylole, are now controlled by the Control of Benzole and Coal Spirit Order, 1944, dated Feb. 18, 1944, S. R. & O. 1944, No. 172, operative from March 1. Carbolic acid, 60's, naphthalene, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil controlled by the Coal Tar Products Prices Order, 1943, dated Oct. 20, 1943 (S. R. & O. 1943, No. 1528), operative from Nov. 15, 1943.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Scotland June 3.

Spot business is scarce, but contract deliveries are proceeding at a steady pace. Refined tar*: Yield to distillers is 4½d. per gallon *ex* Works, naked. Creosote oil: Timber preserving quality,* 5½d. to 6½d.; hydrogenation oil,* 5⅞d.; low gravity or virgin oil,† 7½d. to 7½d.; benzole absorbing oil,* 6½d. to 8d. per gallon. Refined cresylic acid* is 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha†: 6½d. to 7d. per gallon. Solvent naphtha*: Basic prices delivered in bulk, 90/160 grade, 2s. 8d., and 90/190 Heavy naphtha, Unrectified, 1s. 10½d.; Rectified, 2s. 2d. per gallon. Pyridine†: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

* Price controlled. † Uncontrolled.

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